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CROPS RESEARCH

ARS 34-78
August 1965

PRELIMINARY STUDIES OF MATURITY IN SUGARCANE VARIETIES IN FLORIDA - A PROGRESS REPORT

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A high percentage of the sugarcane grown in Florida each year is subjected to freezing temperatures. The need for varieties that can be harvested early in the season before freeze damage occurs is of great importance. It is also of value to know the ones that continue to improve in juice quality during the harvest season. A knowledge of changes in juice quality in different portions of the stalk and in different varieties is necessary to utilize them most advantageously.

Experimental Technique

An experiment designed to measure relative maturing qualities of three commercial varieties was conducted on peat soil at Okeelanta during the 1962, 1963, and 1964 harvest seasons. Cl. 41-223, C.P. 50-28, and C.P. 52-68 were planted in plots 3 rows wide and 32 feet long with 6 replications of each variety. Each plot was subdivided into four 7-foot plots for the four dates of sampling. One of the three rows was used for each year--plant cane, first stubble, and second stubble. Ends and sides were buffered to eliminate border effects. Planting, fertilizing, cultivating, and insect and rodent control were according to plantation practices.

On each date of sampling all the cane in a plot one row wide by 7 feet long was cut by hand. Twenty-stalk samples were taken at random from each plot in early November, mid-December, early February, and mid-March in each of the three harvest seasons. Additional samples were taken from each second-stubble plot on November 27 and December 14, 1964, and segmented into three equal parts for milling and juice analysis.

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In another experiment two adjacent commercial fields of Cl. 41-223 and C.P. 50-28 plant cane were sampled on December 10 and December 28, 1964. Four samples were taken from each field and the stalks were cut into three equal segments and milled for juice analysis.

Crusher juice was analyzed for Brix, apparent sucrose, and purity. Indicated yields of sugar per ton of cane were calculated in accordance with the Winter-Carp-Geerligs formula, with corrections for differences in milling quality as determined in complete milling tests.

Results and Discussion

C.P. 50-28 yielded 175, 200, 181, and 166 pounds of sugar per ton of cane, respectively, on the 4 plant-cane harvest dates (table 1). The variety exceeded C.P. 52-68 on all dates and outyielded Cl. 41-223 on all dates except the one in early February.

First-stubble data during the 1963 harvest season showed C.P. 50-28 and C.P. 52-68 equal or superior to Cl. 41-223 on all dates except early February. Crusher juice obtained from C.P. 50-28 was higher in Brix and sucrose than the juice obtained from C.P. 52-68 only on the November 1 and mid-December dates (data not shown).

TABLE 1.--Average indicated yield of 96° sugar per ton of cane, 1962-64. (Cl. 41-223 = 100)

Variety	Date of harvest							
	November 1		December 15		February 1		March 15	
	Pounds	Percent	Pounds	Percent	Pounds	Percent	Pounds	Percent
Cl. 41-223								
Plant cane	167	100	193	100	182	100	110	100
1st stubble	189	100	199	100	215	100	182	100
2d stubble	162	100	192	100	187	100	138	100
Average	173	100	195	100	195	100	143	100
C.P. 50-28								
Plant cane	175	105	200	104	181	99	166	151
1st stubble	198	105	212	106	204	95	182	100
2d stubble	200	123	220	115	210	112	148	107
Average	191	110	211	108	198	101	165	115
C.P. 52-68								
Plant Cane	149	89	176	91	172	94	160	145
1st stubble	189	100	204	102	206	96	187	103
2d stubble	173	107	209	109	205	110	156	113
Average	170	98	196	100	194	99	168	117

C.P. 50-28 exceeded Cl. 41-223 on all dates including the mid-March harvest in the 1964 second-stubble crop. C.P. 52-68 exceeded Cl. 41-223 only on the mid-March date in the average of all tests.

A measure of relative juice quality after freezes is indicated by the mid-March analyses each year. Both C.P. 50-28 and C.P. 52-68 surpassed Cl. 41-223 after the freeze of December 13, 1962, when the temperature remained at 32° F. or below for 2-1/2 hours and reached a minimum of 29.4°.2/

C.P. 50-28 and Cl. 41-223 were approximately equal in indicated yields of sugar per ton of cane in the first-stubble crop following the freeze of January 15, 1964. Temperatures of 32° or below lasted for 13 hours and a minimum temperature of 28° was recorded.3/ The temperatures remained cool or below normal in February but were above normal in March of that year.

C.P. 50-28 and C.P. 52-68 surpassed Cl. 41-223 in yields of sugar per ton of cane following the freeze of January 18, 1965, when the temperature was below freezing for 11 hours and reached a minimum of 25° (data not shown in tables).4/ The temperature was above normal in both February and March, after the January freeze, a factor conducive to rapid deterioration of sugarcane.

Although considerably higher in fiber content and, hence, of less desirable milling quality, C.P. 50-28 has definite advantages and should be used both for early milling and for its apparent cold tolerance. C.P. 52-68, an erect growing, strong stubbling variety, does not mature as early as previously expected and for that reason it is not recommended for early harvesting.

The maturity of various portions of the stalk at different dates during the harvest season is shown by the analyses presented in table 2. The three varieties behaved differently in the two crops and on the two harvest dates. In the plant cane trial C.P. 50-28 was more mature in the upper part of the stalk on each date, as indicated by higher percentage sucrose analyses on December 10 and 28. Furthermore, the percentages of sucrose in the juice was higher on December 10 than on December 28 in all segments of the stalks for C.P. 50-28. On the other hand, juice obtained from the upper segments of Cl. 41-223 was lower in apparent sucrose than the juice from the lower portion of the stalk on December 10 and essentially equal from all segments on December 28.

2/ Weather data supplied by Stanley Hooks, Okeelanta Sugar Refinery, Inc. (Commercial firms are used in this publication solely for the purpose of providing specific information. Mention of the firm does not constitute an endorsement of the firm by the Department over those not mentioned.

3/ Data from Weather Forecasting, Mimeograph WEA-64-10.

4/ Data from Weather Forecasting, Mimeograph WEA-65-10.

TABLE 2.--Crusher juice analysis of stalk segments of 3 sugarcane varieties in plant cane and second stubble on different dates during 1964

Segment and Variety	Plant cane				Second stubble			
	Sampled Dec. 10		Sampled Dec. 28		Sampled Nov. 27		Sampled Dec. 14	
	Sucrose	Purity	Sucrose	Purity	Sucrose	Purity	Sucrose	Purity
Upper:								
Cl. 41-223	11.92	82.55	14.64	89.05	11.33	83.49	12.97	84.38
C.P. 50-28	15.00	84.55	14.83	83.93	15.67	89.90	16.07	90.38
C.P. 52-68	-	-	-	-	13.93	82.67	13.97	85.49
Middle:								
Cl. 41-223	13.15	84.03	14.83	89.96	16.23	89.27	14.98	87.39
C.P. 50-28	13.77	81.72	12.88	79.16	16.31	86.85	15.33	85.12
C.P. 52-68	-	-	-	-	16.06	87.75	14.33	83.22
Lower:								
Cl. 41-223	12.70	80.69	14.34	88.35	16.41	89.72	15.89	88.57
C.P. 50-28	14.02	88.51	12.65	86.64	16.39	86.26	15.86	86.62
C.P. 52-68	-	-	-	-	15.67	82.34	15.28	85.51

The cane in the second stubble trial behaved differently. There was essentially no increase in the quality of juice from the upper segments of C.P. 50-28 and C.P. 52-68 from November 27 to December 14 and a slight increase in apparent sucrose and purity in the juice obtained from the upper segments of Cl. 41-223 during that period. There were decreases in the quality of juice obtained from the lower two segments of all three varieties. The upper segments were essentially equal in juice quality to the lower segments in all three varieties by mid-December and, on December 14, C.P. 50-28 was more mature in the upper portion of the stalk than in the lower portion.

The practical application of this information is obvious. Although lower topping of stalks is very important early in the season in order to improve the quality of mill cane in the case of late-maturing varieties such as Cl. 41-223, it would be a mistake to top mature varieties such as C.P. 50-28 low, because valuable stalk segments containing juice of high quality would be lost. Although results of these studies are based on one crop cycle--plant cane, first stubble, and second stubble--it is believed that similar results can be expected in all years. The studies will be continued with the same and with other varieties.